SuperGliss® non-stick zhora bipolar forceps – fine-tip bipolar forceps for removal of a large brainstem cavernoma

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Fig. 1: SuperGliss® non-stick zhora bipolar forceps **(REF 78 49 86 SGZ)**

Fig. 4: CURIS® 4 MHz radiofrequency generator

Introduction: Cavernomas are non-malignant, low-pressure blood vessel malformations that can be found along the entire central nervous system. Cavernomas of the brainstem account for only 8-22 % of all intracranial cavernomas. Their growth is slow and occurs by hemorrhagic events. They have an annual risk of hemorrhage of 4-6 % per person-years and a 30-60 % re-hemorrhage rate per person-years. Hemorrhage from a brainstem cavernoma often causes severe neurological deficits, depending on the localization of the lesion, but can also be fatal in up to 20 % of cases. The neurological symptoms vary significantly, but include hemiparesis, internuclear ophthalmoplegia, diplopia, facial paresis, dysphagia, dysarthria, numbness of the face, trunk or extremities, and gait ataxia. Clinical symptoms usually appear in a subacute manner over hours or days and most cases are treated temporarily with corticosteroids to reduce perilesional swelling and secondary problems.

The indication surgery for brainstem cavernomas is debated, but clinical symptoms should be the main indication for surgery and the patient should preferably be included in the decision process.

The timing of surgery for hemorrhagic brainstem cavernomas is also debated. Previously, a cooling-down period of 4-6 weeks after a hemorrhage was recommended. However, as the incidence of rebleeding is highest within one month after surgery, we now recommend surgery after 2-3 weeks with corticosteroids to take advantage of the liquidification of the perilesional hematoma. The main goal of surgery for cavernomas is to eliminate the risk of rebleeding without causing new deficits. A complete removal is essential to prevent re-hemorrhage. Once considered inoperable, brainstem cavernomas are now neurosurgically curable with acceptable operative morbidity in experienced hands.

Many surgical approaches exist, such as suboccipital midline, retrosigmoid, subtemporal and supracerebellar infra-tentorial. Depending on the localization and the relationship between the cavernoma and the pial or ependymal surface of the brainstem, the neurosurgeon will perform a tailored approach. Generally, a lateral entry is preferred whenever possible as the floor of the 4th ventricle holds important functions. In order to reduce the risk of new neurological deficits, intraoperative electrophysiological monitoring of long tracks (MEP and SEP), AEP and cranial nerves is compulsory during brainstem surgery.

Regardless of the approach used, surgery for brainstem cavernomas requires very precise instruments to avoid injury to cranial nerves and to the fragile surrounding structures inside the brainstem. Here we report our experience using the 0.2 mm SuperGliss non-stick zhora, a precise dissection tool rather than a bipolar for brainstem surgery.

Surgical approach and technique: The patient was a 42-year old man who presented with sudden-onset nausea, vomiting, vertigo, blurred vision, and marked imbalance. The patient described difficulty swallowing and neurological evaluation showed bilateral ataxia, generalized hyperreflexia with left-sided predominance, nystagmus, slight left labial asymmetry, uvula deviation to the right, and tongue deviation to the left. Romberg sign was positive.

A CT scan revealed a well-delineated, round, and hyperdense centimetric lesion in the medulla oblongata and a subsequent MRI demonstrated a 13-mm brainstem cavernoma with hemorrhage and oedema (Fig. 2 A and B). Due to the symptoms' persistence and severity two weeks after the initial bleed, we proposed a microsurgical excision of the cavernoma.

Surgery was performed under neuro-monitoring for cranial nerves IX to XII, as well as sensory and motor evoked potentials. A 10 cm midline skin incision and a 17 mm suboccipital craniectomy was undertaken. Intradurally, a sub-tonsillar approach exposed the floor of the 4th ventricle and revealed spots of underlying haemorrhage and cavernoma (Fig. 3). A complete excision of the cavernoma was effected without changes in the neuromonitoring recordings. The 0.2 mm fine-tip SuperGliss non-stick zhora bipolar forceps are sufficiently sharp to define the tumor borders and were used as a dissection tool rather than as a bipolar in order to avoid thermal damage to the brainstem tissue.

Results: The patient recovered rapidly after surgery. Postoperatively, the hypoglossal improved markedly, but tongue paresis on the left was still present at 2 weeks, as was his labial asymmetry. His dysarthria, dysphagia and balance were subjectively better, but the nystagmus was still present at his final neurological exam before starting formal neuro-rehabilitation. Postoperative control MRI confirmed complete removal (Fig. 6). Pathology examination confirmed the suspected cavernoma.

The SuperGliss non-stick zhora bipolar

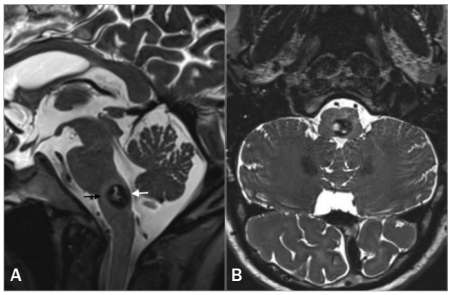

Fig. 2: Preoperative MRI of the brainstem cavernoma

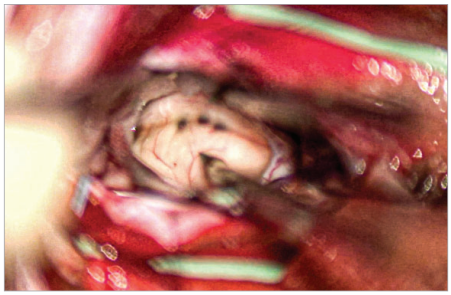

Fig. 3: Intraoperative view of the floor of the 4th ventricle

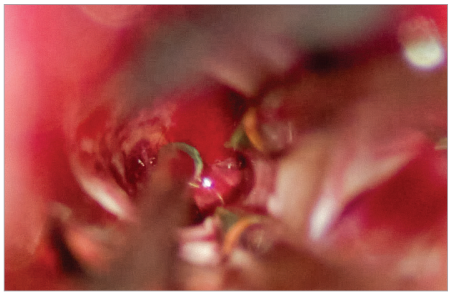

Fig. 5: Cavernous hemangioma resection

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forceps was an important tool for this surgery. It allowed ultra-precise dissections with its pointed, triangular-shaped 0.2 mm tips. The 10° upward tilt aids visualization of the tips in deep and narrow surgical corridors.

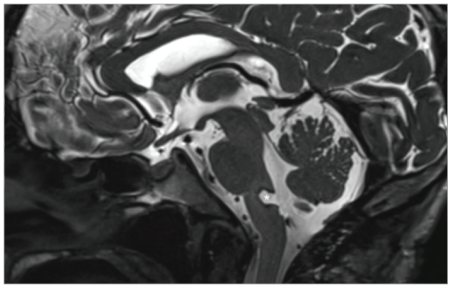

Fig. 6: Postoperative MRI

Conclusion: The 0.2 mm fine-tip SuperGliss non-stick zhora bipolar forceps is a precise and versatile tool for surgery of brainstem lesions. We also use it routinely in skull base and vascular neurosurgery.

References: 1. Porter RW, Detwiler PW, Spetzler RF, Lawton MT, Baskin JJ, Derksen PT, et al. Cavernous malformations of the brainstem: experience with 100 patients. J Neurosurg. 1999;90:50–58. **2.** Dukatz T, Sarnthein J, Sitter H, Bozinov O, Benes L, Sure U, Bertalanffy H, Quality of Life After Brainstem Cavernoma Surgery in 71 Patients, Neurosurgery 2011; 69(3):689–695. **3.** Management of brainstem cavernous malformations. Almefty KK, Spetzler RF. World Neurosurg. 2015;83(3):317-319. **4.** Kearns KN, Chen CJ, Tvrdik P, Park MS, Kalani MYS. Outcomes of Surgery for Brainstem Cavernous Malformations: A Systematic Review. Stroke. 2019;50(10):2964-2966.

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Product Information

Qty.	REF	Description
1	**78 49 86 SGZ**	**SuperGliss® non-stick zhora** bipolar forceps bayonet, tips: 0.2 x 5.0 mm, 10° eccentric, total length: 20.0 cm, working length: 8.5 cm

[REF 87 00 10] CURIS® 4 MHz radiofrequency generator
basic set with single-use patient plates

Qty.	REF	Description
1	**36 01 00-01**	**CURIS®** 4 MHz radiofrequency generator (incl. mains cord, user manual and test protocol)
1	**36 01 10**	Foot switch two pedals for CURIS® (cut & coag), cable: 4 m
1	**37 01 54L**	Bipolar cable for CURIS®, length: 3 m (not shown)
1	**36 07 04**	Monopolar handpiece (pencil) cut & coag, shaft 2.4 mm, cable: 3 m (not shown)
1	**36 02 38**	Cable for single-use patient plates, length: 3 m (not shown)
1 (x50)	**12 80H**	Patient plates, single-use, 5 x 10 pcs. (not shown)

Unit settings / Other accessories*
CURIS® 4 MHz radiofrequency generator **SuperGliss® non-stick zhora**: Bipolar Precise Power adjustment: 4 to 8 watts

* Please consider that this information is not meant to serve as a detailed treatment guide. Always adjust according to patient and application.

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